

Work Order ID 140212

Thursday, December 17, 2015 3:44:28 PM

140212

Page 1

Item ID: D6104-005 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: Stop ***NS2***
 Item Name: Round Billet, 17-4
 Start Date: 12/17/2015 Start Qty: 10.00 ***10*** Cust Item ID:
 Required Date: 12/17/2015 Req'd Qty: 10.00 ***10*** Customer:
 Reference:

Approvals: Process Plan: MCS Date: JAN 04 2016 Tooling: _____ Date: _____
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____
 Run Start ***NR1***
 Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D6104	Rev B

100	PURCHASING	0.00				DAS 13 9-89	JAN 08 2016	10
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100
 Purchasing
 Purchasing
 Memo
 Issue P/O: 30939 a) Description: S.S round billet b) Ø4.00" x 5.10" long c) Tolerance on all dimensions are +0.030"/-0.000" d) Material: 17-4PH Stainless steel (Ams 5643 or Aisi 630) e) One blank makes 2 parts f) Material certification required

110	Receive & Inspect for Damage & Mat'l Certs	0.00						
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110
 Packaging
 Packaging
 Memo
 Ensure material certification is attached

120	QC18 In-Coming Inspection Material	0.00						
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120
 QC
 Quality Control
 Memo
 Ensure Material certification comply to Dwg D6104

10x 8016-01-13
10 14
9-89
16/01/14

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :				MRB (QSI042) Approval Completed By Lead hand / Supervisor Approval Verification QC / QA Coordinator Approval	
Description Work Order Deviation				Disposition					
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER :							
Misidentified ☐	Past Due ☐								

Work Order ID 140212

140212

Page 2

Thursday, December 17, 2015 3:44:28 PM

Item ID: D6104-005

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Round Billet, 17-4

Start Date: 12/17/2015 Start Qty: 10.00

10

Cust Item ID:

Required Date: 12/17/2015 Req'd Qty: 10.00

10

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

130

Identify as per dwg & Stock Location: MAT043 0.00

130

Packaging

Memo

0.00

Packaging

LOCATION: MAT043

10

10

DAS

14

9-09

16/01/14

140

QC21- Final Inspection - Work Order Release 0.00

140

QC

Memo

0.02

Quality Control

ML5

JAN 14 2016

ML5

JAN 14 2016

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width: 100%; border: none;"> <tr> <td style="width: 15%;">Skid-tube ☐</td> <td style="width: 15%;">Cross tube ☐</td> <td style="width: 15%;">Water Jet ☐</td> <td style="width: 15%;">Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
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Picklist Print

Thursday, December 17, 2015 3:44:27 PM

Page 1

Work Order ID: 140212

140212

Parent Item: D6104-005

D6104-005

Parent Item Name: Round Billet, 17-4

Start Date: 12/17/2015

Required Date: 12/17/2015

Start Qty: 10.00

Required Qty: 10.00

Comments: IPP A: 01.05.08New Issue EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6104-005P		Purchased	No			110	Each	0.0000	1	10			
D6104-005P									**				
17-4 SS Roundbar 4.00"Od													

16-01-14

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

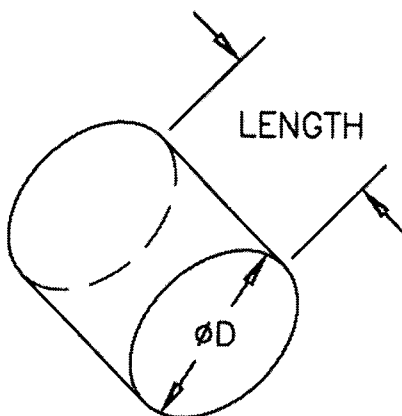
Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐																																																													
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Misidentified ☐	Past Due ☐																																																																



DESIGN <i>JP</i>	DRAWN BY <i>JP</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>JP</i>	APPROVED <i>JP</i>	DRAWING NO. D6104	Rev. B SHEET 1 OF 1
DATE 02.11.25		TITLE ROUND BILLET, 17-4	SCALE NTS
A	01.04.10	NEW ISSUE	
B	02.11.25	CLARIFY ALLOY SPEC ADDED D6104-009/-011 REDUCE LENGTH OF BILLETS	

RELEASED
02.11.29 *JP*

SPECIFICATION CONTROL DRAWING



140212 MWS
16-01-04

MATERIAL: 17-4 PH SS (AMS 5643 OR AISI 630) MIN UTS = 170 KSI (38 HRc)

PURCHASE MATERIAL ACCORDING TO THE FOLLOWING TABLE. SPECIFY ALLOY, DIAMETER x LENGTH (+0.030/-0.000) AS SHOWN.

TOLERANCE ON ALL DIMENSIONS IS +0.030/-0.000.

ALL DIMENSIONS ARE IN INCHES

Part No.	Alloy	D (Diameter)	Length
D6104-001	17-4 PH STAINLESS STEEL	Ø3.00	3.80
D6104-003	17-4 PH STAINLESS STEEL	Ø3.25	3.80
D6104-005	17-4 PH STAINLESS STEEL	Ø4.00	5.10
D6104-007	17-4 PH STAINLESS STEEL	Ø4.50	5.10
D6104-009	17-4 PH STAINLESS STEEL	Ø5.25	4.10
D6104-011	17-4 PH STAINLESS STEEL	Ø6.50	4.10

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Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID PO30939

Purchase Order Date 1/8/2016

PO Print Date 1/8/2016

Page Number 2 of 2

Order From :
METAUX CASTLE
P.O. BOX 4090 STN A
TORONTO, ONTARIO M5W OE9
CANADA

VU-MET002

Ship To : DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name

Vendor Phone

Ship To Contact

Ship To Phone

Ship Via: Yours ppd

Ship Acct:

Buyer

Customer POID

Customer Tax #

Terms

Currency

FOB

Chantal Lavoie

10127-2607

Net 30

USD

Destination-Collect

Line Total: \$1,122.20

3 D6104-005P 17-4 SS Roundbar 4.00"Od 1/22/2016
Yes
1/22/2016

10.00
Each

\$54.20

\$542.00

AS PER DWG D6104 REV. B
B140212
MATERIAL: 17-4 PH AS PER AMS 4643 OR AISI 630
SIZE: 4.00" X 5.10" LONG

Line Total: \$542.00

4 71401-45 procurement quality clauses 1/22/2016
No
1/22/2016

1.00

\$0.00

\$0.00

Procurement Quality Clauses
A005 right of entry
A012 chemical and physical test report
A016 personnel qualification
A017 raw material identification (as applicable)
A026 certification of material conformance
A041 quality management system
A042 dart notification by supplier
A043 retention of quality documents

Line Total: \$0.00

PO Total: \$2,370.00

Note: Terms & Condition of Purchasing(Suppliers) and Procurement Quality Clauses are an integral part of our AS9100 requirements. To learn in detail, please visit www.dartaerospace.com for further explanation.

Change Nbr: 1

Change Date: 1/8/2016

**Castle Metals®**

A. M. Castle & Co.

**PACKING SLIP/
CERTIFICATE OF CONFORMANCE**

Page 1 of 2

Shipment No:2846103

Ship From: A. M. CASTLE & CO. 2150 ARGENTIA ROAD MISSISSAUGA, ON L5N 2K7 CAN		Sold To: DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA		Ship To: DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CAN		Deliver To: DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA	
Date Shipped 12-JAN-16	F.O.B. ORIGIN	Freight Terms Prepaid		Carrier MANITOULIN		BOL No 2846103-2	

Shipment Details	Final Destination Branch - TOR
-------------------------	---------------------------------------

Order No 4204156	Line No 1	Item No 42464/MO	Description 4.0000.RD.17CR-4NI.STAINLESS.RT.SOL TR.COND A.132.0000-156.0000 CUT TO 5.1 IN (+ .1250/- .0000 IN) - BAND SAW CUTTING SPECIFICATIONS: AMS 5643 USE ONE HEAT ONLY ALL PAPERWORK MUST FOLLOW ORDER / CUSTOMER MUST RECEIVE AT TIME OF DELIVERY ALL MATERIAL MUST HAVE IDENTIFYING MARKINGS EX:HEAT #'S Email P/s and certs to: clavoie@dartaero.com								
Purchase Order No 30939		Part Number YOUR ITEM NUMBER: D6104-005		Ordered Qty 10.00 PCS			Invoice Qty 10.00 PCS				
Details			ALL PAPERWORK MUST FOLLOW ORDER / CUSTOMER MUST RECEIVE AT TIME OF DELIVERY ALL MATERIAL MUST HAVE IDENTIFYING MARKINGS EX:HEAT #'S Email P/s and certs to: clavoie@dartaero.com END USER: DART AEROSPACE END USE: COMMERCIAL AIRCRAFT PARTS SP 16-01-13								
Delivery No.	Mill	Heat Number			Mech Id	PCS	Width (IN)	Length (IN)	Shipped Qty(LBS)		



Castle Metals®

A. M. Castle & Co.

**PACKING SLIP/
CERTIFICATE OF CONFORMANCE**

Page 2 of 2

120303133	NORTH AMERICAN STAINLESS			10			187.2907
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These commodities/technologies are subject to US Export Administration & US State Dept. Regulations and if intended for export, were/are exported thereunder. Diversion contrary to US Law is Prohibited.

We hereby certify the material covered by this certification conforms in accordance with the above specifications and has been found to meet the applicable requirements for the material, including any specifications forming a part of the description. Test reports are on file subject to examination. All claims for defective material are waived unless made in writing to A.M. Castle & Co. within 60 days of the shipment. Material cut to the correct size, or material cut by the customer cannot be returned for credit.

Reviewed by Authorized Castle Metals Representative: _____

Date: _____

Name: _____



JAN 11 2016

Sp/6-01-B



METALLURGICAL TEST REPORT



6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 116390 02 Mail To:
A.M. CASTLE AND COMPANY
1420 KENSINGTON ROAD-SUITE 220
OAK BROOK IL 60523

Ship To:
A.M. CASTLE AND COMPANY
2602 PINWOOD DRIVE
GRAND PRAIRIE TX 75051

Date: 11/20/2015 Page: 1 Of 1
Steel: 630(17-4)
Finish: Hot Finish
Dia/Thk: 4.0000 in
Leg Length:
Length: 144.00 in
Corrosion:

Customer: 0032 017

NAS Order: LP 39936 1

Your Order: 354395-1

Item Code: 42464

PRODUCT DESCRIPTION:

AMS 2303E, AMS 5643R
Round Bar, Hot Rolled, Annealed, Rough Turned
UNS S17400; EN 10204 3.1, ASTM A484/11, MACRO OK, AMS 5643T
ASTM A564/13, AMS 2303, ASME SA564-07, ASTM F899/11 (CHEM ONLY)
SOL. ANNEALED @ 1900F MIN FOR 1 HR MIN. and air cooled to RT
UT per API6A PSL3, ASTM A388-S1 criteria, UT passed
H900 MECH. PROPERTIES ARE CAPABILITY ONLY*

REMARKS:

COMPLIES W/REQUIREMENTS OF DFAR 252.225-7009 EU DIRECTIVE
2011/65/EU. RoHS. EAF+AOD+CC. NO WELD REPAIR. MELTED AND MFG
IN USA FREE FROM MERCURY AND LOW MELTING ALLOY CONTAMINATION

DAS
14 16/01/14
9-89

Bundle Weight	Bundle Weight	Bundle Weight	Bundle Weight	Bundle Weight	Bundle Weight	Bundle Weight	Bundle Weight	Bundle Weight
BH50374 2622	BH50385 1587	BH50477 523						

Lab Accreditation Bureau, ISO/IEC 17025, Certificate# L2323

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

Chemical Analysis per ASTM A751/08

Heat	Supplier #	CM	C %	CB %	CO %	CR %	CU %	MN %	MO %	N %	NI %	P %
W5L9		US	.022	.176	.09	15.38	3.02	.77	.09	.027	4.21	.020
			S %	SI %	TA %	TI %						
			.0285	.62	.0080	.0020						

MECHANICAL PROPERTIES

	1 d	HB	Grain	Ferrite	TS-900CAP	YS-900CAP	EL-900CAP	RA-900CAP	RC-900CAP	FREQ.	SEV.
	o i	No.	No.	%	KSI	KSI	% 4D	%	No.	No.	No.
BH50374	R L	341.0	8.0	.10	200.24	175.93	12.88	44.20	42.5	.20	.11
BH50385	R L	341.0	8.0	.10	200.24	175.93	12.88	44.20	42.5	.20	.11
BH50477	R L	341.0	8.0	.10	200.24	175.93	12.88	44.20	42.5	.20	.11

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS

Technical
Dept. Mgr.

ABHIJEET BHAVE

MATERIAL RECEIPT INSPECTION FORM

MATERIAL: D6104-005
 DATE: 16/01/14

PO / BATCH NO.: 30939/140212

MATERIAL CERT REC'D: yes
 QUANTITY RECEIVED: 10
 QUANTITY INSPECTED: 10
 QUANTITY REJECTED: _____

THICKNESS ORDERED: 84.00 X 5.100
 THICKNESS RECEIVED: 84.045 X 5.220
 SHEET SIZE ORDERED: _____
 SHEET SIZE RECEIVED: _____

DESCRIPTION	NCR (Check Y/N)	COMMENTS
SURFACE DAMAGE	Y ☒ N ☐	
CORRECT FINISH	☒ Y ☐ N ☐	
CORROSION	Y ☐ N ☒	
CORRECT GRAIN DIRECTION	☒ Y ☐ N ☐	
CORRECT MATERIAL	☒ Y ☐ N ☐	
CORRECT THICKNESS	☒ Y ☐ N ☐	
PHOTO REQUIRED	Y ☐ N ☒	
CORRECT MATERIAL	☒ Y ☐ N ☐	
CORRECT REF # TO LINK CERT	☒ Y ☐ N ☐	
CORRECT MATERIAL IDENTIFICATION	☒ Y ☐ N ☐	
CORRECT M# ON THE MATERIAL	☒ Y ☐ N ☐	
DOES THIS MATERIAL REQUIRE ENGINEERING SIGN OFF	Y ☐ N ☒	
DOES THIS REQUIRE AN EXTRUSION REPORT	Y ☐ N ☒	

CUT SAMPLE PIECE OF MATERIAL AND PREFORM A HARDNESS CHECK. RECORD RESULTS BELOW				
TYPE OF MATERIAL	HRC	HRB	DUR A	DUR D
SIZE OF TEST SAMPLE				
HARDNESS / DUROMETER READING				

testers located in the Quality Office

QC 18 INSPECTION	ENGINEERING SIGNOFF (if required)
INSPECTED BY: <u>DAS</u> <u>14</u> DATE: <u>16/01/14</u>	SIGNED OFF BY: _____ DATE: _____

Attach this inspection sheet with the corresponding material cert and remit to be scanned and received in

MATERIAL RECEIPT INSPECTION FORM

INSTRUCTIONS FOR INSPECTING BAR, TUBING, ROUND, & SHEET STOCK

- 1- VERIFY STOCK TO DART PURCHASE ORDER
- 2- MEASURE ALL DIMENSIONS FOR EACH PURCHASED STOCK
 - a. WIDTH, THICKNESS, DIAMETER, WALL THICKNESS & LENGTH
- 3- VERIFY CONDITION OF MATERIAL i.e. DAMAGED, CORRODED, etc.
- 4- VERIFY THAT SUPPLIER HAS A NUMBER (HEAT #) ON ITS RECEIVING REPORT TO LINK TO MATERIAL CERTS
- 5- VERIFY MATERIAL CERTS ARE CORRECT TO THE DART PO INSTRUCTIONS
- 6- REMOVE / CUT A PIECE OF MATERIAL FOR SAMPLE HARDNESS TESTING

INSTRUCTIONS FOR INSPECTING SKIDTUBE & STEP EXTRUSION

- 1- VERIFY TO DART SUPPLIED DRAWING
- 2- SAMPLE INSPECT MATERIAL IN BUNDLE TO ENSURE MATERIAL CAN BE RECEIVED INTO DART
- 3- USING PORTABLE HARDNESS TESTER VERIFY HARDNESS OF THE MATERIAL TO THE DRAWING
- 4- VERIFY THAT MATERIAL CERTS MATCH TO WHATS CALLED UP ON THE DART DRAWING

AFTER MATERIAL PASSES INSPECTION

- 5- HAVE DART EMPLOYEES START STOCKING MATERIAL BUT REQUEST MIN **20pcs** FOR FULL INSPECTION
- 6- INSPECT ALL DIMS AS PER DRAWING REQUIREMENTS

INSTRUCTIONS FOR INSPECTING CROSS TUBE MATERIAL

- 1- VERIFY MATERIAL CERTS MATCH THE REQUIREMENTS ON THE DART DRAWINGS
- 2- INSPECT MIN. HALF THE BATCH OF EXTRUSION RECEIVED INTO DART
- 3- INSPECT MATERIAL AS PER THE EXTRUSION REPORT
 - a. WALL THICKNESS USING ULTRA-SONIC IN 4 LOCATIONS
 - b. OUTSIDE DIAMETER HIGHEST/LOWEST BOTH ENDS
 - c. INSIDE DIAMETER HIGHEST/LOWEST BOTH ENDS
 - d. STRAIGHTNESS @ CENTER OVER 12" SPAN
 - e. WALL THICKNESS USING TUBE MICROMETER HIGHEST/LOWEST BOTH ENDS
- 4- IDENTIFY EACH TUBE IN SEQUENCE OF INSPECTING (TUBE 1, TUBE2.....) AND W/O# AND PO#
- 5- RECORD ALL FINDINGS ON EXTRUSION REPORT

IF ANY QUESTIONS PLEASE SEE QC COORDINATOR BEFORE GOING FURTHER